

DETAILED ACTION

Allowable Subject Matter

1. The indicated allowability of claim 4 is withdrawn in view of the newly discovered reference(s) to Barney in view of Petruska. Rejections based on the newly cited reference(s) follow. The finality of the previous rejection has been withdrawn.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barney in 2002/0110180 in view of Petruska in 7226953.

Regarding Claims 4-5 and 8: Barney teaches a temperature sensing composition that includes a matrix composition and semiconductor nanocrystals exhibiting fluorescence, wherein the nanocrystals have a particle size in the range from 1.5-12.5 nm. It is stated that the quantum efficiency of the nanocrystals used can be greater than 20% and even greater than 80%. (See Paragraph 18). Barney goes on to state that the matrix in which the semiconductor nanocrystals are disposed can be an inorganic matrix such as a sol-gel derived matrix. (See paragraph 30). Barney then gives suitable precursors for such a matrix including hydrolysable compositions including silicon alkoxide ($\text{Si}(\text{OR})_4$) (See Paragraph 32).

Barney fails to teach functionally modified triethoxy silane as a sol-gel precursor.

However, Petruska teaches that the loading amount in sol-gel glasses can be optimized by a ligand exchange process on the semiconductor particles. After this ligand exchange, the semiconductor is passivated and functionalized to interact with the host matrix (a different material than the solid matrix). This process is said to increase the

amount of quantum dots which can be suitably incorporated (dispersed) into a sol-gel matrix to up to 20 vol%. Based on the minimum QD size taught by Barney, this leads to a maximum molarity of $1.69 \text{ mol/l} ((\text{vol of QD}/\text{vol of individual QD})/(\text{Avogadro's number}))$ of the quantum dots. This range of molarities represents an overlapping range with the claimed subject matter. This high loading as stated before is accomplished by a ligand exchange of the semiconductor particles wherein, the ligands on the particles are substituted with a ligand having the formula $X-Z-Y$, wherein X includes among others amino groups, Z is a carbonaceous group including alkyl, and aryl (phenyl), and alkylaryl groups, wherein the units repeat from 1 to 20 times, and finally Y is a functional group to interact with the silane compound, which is chosen from a group comprising hydroxyl, carboxylic, and alkoxy silane groups. Using the above ligands in conjunction with the silicon alkoxides of Barney forms a sol-gel glass of the same composition as that claimed. It is noted once again that the use of the modified trialkoxy silanes is a product by process claim. The use of the above mentioned ligands would result in a sol-gel glass of the same chemical structure as the sol-gel glass claimed. Although there are differences in the process of making the glass, the final product is essentially the same. Proof of this fact is shown in Figure 1 of Petruska, which shows the structure of an exemplary glass, wherein, it is shown that an amine passivation agent integrally links through an alkyl group to the metal elements within the sol-gel matrix. Said amine passivation agent has the general formula $H_2NC_mH_{2m}$. Therefore, the combination of Barney in view of Petruska results in a sol-gel glass

comprising the product of said organoalkyoxysilanes claimed. As is shown in the figure, the values associated with n range from 1-3 as claimed.

Regarding Claim 6-7: Both Barney and Petruska teach the suitability of II-VI semiconductors. Both teachings include specific examples pertaining to CdSe, although CdTe is also shown to be a suitable quantum dot semiconductor for use in their endeavors. It is noted that this claim also includes product by process limitations. The product of Barney in view of Petruska, however, teaches the same product as that which is claimed, as Petruska teaches the surface modification of the QD's to incorporate ligands, which disperse and cause the QD's to interact with certain matrix compositions and become part of the solid matrix. So, although the product by process limitations are noted, these limitations only distinguish the product insofar as they structurally or chemically define the product. The instantly claimed product by process limitations do not accomplish teaching a structure other than that taught by Barney in view of Petruska.

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 1010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 4-8 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 6-7 of copending Application No. 10/543185. Although the conflicting claims are not identical, they are not patentably distinct from each other because The range of compositions of the instant claims represent an overlapping range with that of the copending application in concentration amounts from 2.5×10^{-4} mol/l. The useful organoalkoxysilanes also represent overlapping compositions as both patents include aminoalkyl and phenyl groups.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

8. Applicant's arguments with respect to claim 1-3 and 5-8 have been considered but are moot in view of the new ground(s) of rejection. The rejection over Talapin has been vacated and the allowability of claim 4 has been withdrawn as is noted above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Hoban whose telephone number is (571)

270-3585. The examiner can normally be reached on Monday - Friday from 7:30 AM to 5 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on (571) 272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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